Claims

1. A method of increasing ploidy in cells of a woody perennial plant, the method comprising:

contacting plant tissue comprising dividing cells with an effective amount of a composition comprising about 0.5% w/v colchicine to about 3% w/v colchicine.

2. The method of claim 1 wherein the concentration of colchicine is about 0.8% w/v to about 1.5% w/v.

3. The method of claim 1 wherein the concentration of colchicine is about 1% w/v.

4. The method of claim 1 wherein the woody perennial plant is a deciduous woody perennial.

5. The method of claim 1 wherein the plant is selected from the group consisting of a *Prunus* spp. *Pyrus* spp, *Malus* spp, *Citrus* spp, *Poncirus* spp, *Persea* spp, *Mangifera* spp, *Punica* spp, *and Olea* spp.

6. The method of claim 1 wherein said plant tissue is at least one bud.

7. The method of claim 1 wherein said tissue is an apical or terminally dominant bud.

8. The method of claim 6 or claim 7, wherein said plant tissue is at least one bud grafted onto a rootstock plant.

9. The method of claim 8 wherein the apical shoot and all buds of the rootstock plant have been removed.

10. The method of claim 8 or claim 9, wherein said plant tissue is a single grafted bud.

11. The method of claim 1 wherein the method further comprises prior to said contacting step exposing said plant tissue to conditions sufficient to break dormancy of said plant tissue.

12. The method of claim 11 wherein conditions sufficient to break dormancy of said plant tissue comprise maintaining said plant tissue at an appropriate temperature for a time sufficient to satisfy the chill requirement of said plant tissue, optionally in the presence of hydrogen cyanimide, and maintaining said plant tissue at an appropriate temperature for a time sufficient to prime cell division in said plant tissue.

13. The method of claim 1 wherein said contacting comprises at least partially enveloping said active tissue in an absorbent material.

14. The method of claim 13 wherein said absorbent material is a cotton based material, or sponge or sponge-like material or foam.

15. The method of claim 14 wherein said cotton based material is cotton wool.

16. The method of claim 1 wherein said plant tissue is at least partially enveloped with a material capable of inhibiting gaseous exchange.

17. The method of claim 16 wherein said material capable of inhibiting gaseous exchange is a plastic film.

18. The method of claim 1 wherein the composition further comprises one or more agents or carriers capable of enhancing plant tissue penetration of said colchicine.

19. The method of claim 18 wherein the agent capable of enhancing plant tissue penetration is selected from the group consisting of surfactants, wetting agents, oils and dimethylsulfoxide.

20. The method of claim 1 wherein said contacting comprises substantially continuous exposure of said tissue to said composition over a period from about one day to about 30 days.

21. The method of claim 1 wherein said contacting comprises substantially continuous exposure of said tissue to said composition over a period from about 5 days to about 15 days.

22. The method of claim 1 wherein said contacting comprises substantially continuous exposure of said tissue to said composition over a period of about 10 days.

23. The method of claim 1 wherein said contacting comprises multiple applications of said composition.

24. The method of claim 23 wherein said multiple applications comprises two or more applications per day.

25. The method of claim 23 wherein at least one of said applications is administered when plant cell division is substantially maximal.

26. The method of claim 1 wherein said plant tissue is exposed to ultraviolet, or fluorescent light or to a mercury and/or sodium lamp prior to or during said contacting.

27. The method of claim 1 or claim 26, wherein said plant tissue is exposed to ultraviolet, or fluorescent light or to a mercury and/or sodium lamp substantially continuously subsequent to said contacting at least until growth from the treated tissue occurs.

28. A method of increasing ploidy in cells of a deciduous woody perennial plant, the method comprising:

contacting at least one bud of said plant, wherein said bud comprises actively dividing cells, with a composition comprising about 0.5% w/v colchicine to about 3% w/v colchicine,

at least partially enveloping said bud with a material capable of inhibiting gaseous exchange, wherein said contacting is substantially continuous over a period of from about 5 days to about 15 days.

29. The method of claim 28 wherein the method further comprises prior to said contacting step exposing said plant tissue to conditions sufficient to break dormancy of said plant tissue.

30. A method of generating a plant having a desired ploidy level, the method comprising:

contacting plant tissue comprising dividing cells with an effective amount of a composition comprising about 0.5% w/v to about 3% w/v colchicine,

generating at least one plant from tissue so contacted,

selecting at least one plant having the desired ploidy level.

31. The method of claim 30 wherein the method further comprises prior to said contacting step exposing said plant tissue to conditions sufficient to break dormancy of said plant tissue.

32. The method according to claim 30 wherein the desired ploidy level is diploid (2N), tetraploid (4N) or hexaploid (6N), octoploid (8N), decaploid (10N) or dodecaploid (12N).

33. A method of generating a plant having at least one desired trait, the method comprising:

contacting parental diploid plant tissue comprising dividing cells with an effective amount of a composition comprising about 0.5% w/v to about 3% w/v colchicine,

selecting tetraploid tissue from said treated plant tissue,

generating at least one tetraploid plant from said tetraploid tissue,

crossing said tetraploid plant with a diploid plant,

generating at least one progeny plant having the desired trait.

34. The method of claim 33 wherein the method further comprises prior to said contacting step exposing said plant tissue to conditions sufficient to break dormancy of said plant tissue.

35. The method of claim 33 wherein the desired trait is seedlessness.

36. The method of claim 33 wherein crossing said tetraploid plant with a diploid plant comprises crossing said tetraploid plant with said parental diploid.

37. A method of increasing ploidy in cells of a woody perennial plant, the method comprising:

contacting plant tissue comprising dividing cells with an effective amount of a composition comprising an agent capable of inhibiting spindle formation, wherein said contacting commences substantially coincidental with breaking dormancy of said plant tissue.

38. A method of generating a plant, the method comprising:

contacting plant tissue comprising dividing cells with an effective amount of a composition comprising about 0.5% w/v colchicine to about 3% w/v colchicine,

selecting plant tissue of increased ploidy level,

generating at least one plant from said selected plant tissue,

crossing said generated plant with a plant of the same or different ploidy.

39. The method of any one of claims 1 to 38 wherein said contacting commences substantially coincidental with breaking dormancy of said plant tissue.